

SYNOPSIS OF CHAETOPAPPA (COMPOSITAE-ASTEREAE)
WITH A NEW SPECIES AND THE INCLUSION OF LEUCELENE

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ABSTRACT

Chaetopappa includes species with a pappus ranging from one of strictly capillary bristles, a combination of bristles and scales, or a short crown, or in two species the pappus is essentially absent. Leucelene ericoides (Torrey) E. Greene, which has only bristles, is transferred to Chaetopappa. Chaetopappa asteroides var. imberbis A. Gray, an endemic of southeast Texas with only a coroniform pappus, is elevated in rank to species. Chaetopappa keerlioides Shinners is treated as a synonym of C. parryi A. Gray. A key emphasizing pappus characters is presented to distinguish the eleven species of the genus, and a brief summary of the distribution, habitat, and phenology is given for each species.

I. Merger of Leucelene with Chaetopappa

Chaetopappa as recognized by Shinners (1946a) included species with a pappus of a hyaline crown, hyaline scales, or a combination of an equal number (usually 5 each) of alternating scales and awn-like bristles, or with the pappus reduced to a minute crown or ring and appearing essentially absent. Soreng and Spellenberg (1984) recently described a new species with a pappus of numerous (13-19) bristles as well as an outer series of narrowly lanceolate scales. The description (Turner, 1977) of the distinctive C. plomoensis B. Turner added what appears to be only a small evolutionary step further in diversification of the pappus in Chaetopappa -- numerous (ca. 25) bristles without scales. Turner contrasted C. plomoensis with C. parryi A. Gray, which has a coroniform pappus without bristles, and I agree that the two species appear to be closely related.

The widespread and common Leucelene ericoides (Torrey) Greene has long been recognized as closely similar to Chaetopappa. Shinners (1946b) commented that "It hardly differs from Chaetopappa except in the entirely capillary pappus and characteristically creeping root and often partially underground stem." Since the pappus of C. plomoensis is identical to that of L. ericoides, and caudex-like, partially underground branches commonly occur in C. parryi and C. plomoensis, Leucelene cannot be justifiably maintained as a genus separate from Chaetopappa. I make the following combination to unite them:

Chaetopappa ericoides (Torrey) Nesom, comb. nov.

Inula? *ericoides* Torrey, Ann. Lyceum Nat. Hist. New York 2:212. 1828. TYPE: United States, probably Texas, "on the Canadian," summer, 1820, Dr. Edwin James s.n. (NY).

See below for further information about this species.

II. Elevation in rank of *Chaetopappa asteroides* var. *imberbis*

A study of the variation within *Chaetopappa asteroides* (Nutt.) DC. has convinced me that the following taxon is best regarded as a distinctive species.

Chaetopappa imberbis (A. Gray) Nesom, stat. et comb. nov.

Chaetopappa asteroides (Nutt.) DC. var. *imberbis* A. Gray, Proc. Amer. Acad. Arts 16:82. 1880. TYPE: Texas, Gonzales Co., post oak woods, April, 1849, C. Wright s.n. (Holotype: GH!; isotype: US). Shinners (1946a) discussed the location of the type collection, noting that it probably was either in Fayette or Gonzales county; now knowing the species distribution in some detail, it almost certainly was in the latter.

Annuals 4-15 cm tall from a slender taproot, branching from above the middle of the initial stem. Stems with thin, spreading hairs 0.5-1.2 mm long, thin and spreading or appressed above and spreading below, rarely appressed above and below, always prominently glandular with minute, sessile or short-stipitate resin glands. Leaves moderately hirsute with long, erect-spreading hairs, glandular like the stems; basal leaves oblanceolate-spatulate to oblanceolate-obovate, 8-26 mm long, 3-6 mm wide at the widest point, with a long-attenuate petiolar base about half the leaf length, apices rounded-obtuse to slightly emarginate; cauline leaves ascending, somewhat reduced in size, becoming epetiolate upwards. Heads turbinate-cylindric, 2-3 (-4) mm wide; phyllaries elliptic to lanceolate or oblanceolate, with broad, white, scarious margins, 3.5-4.5 mm long, the outer strongly rounded-keeled at fruit maturity, moderately strigose. Rays 8-19 in a single series, the ligules white, drying white to purplish, 4-5 mm long, 1.2-2 mm wide, coiling upon maturity. Disc corollas 2.5-3 mm long, with resin droplets on the upper part. Achenes brown to purplish, oblanceolate, slightly compressed, 8-nerved, 1.5-1.8 mm long, 0.5-0.6 mm wide, with long hairs in 8 lines. Pappus a white, hyaline, erose-margined, asymmetrical, cup-like crown 0.2-0.5 mm high, without bristles.

Endemic to southeast Texas, open areas in deep, loose, sandy soil, particularly of the Carrizo Formation (marked below by an asterisk), usually in oak woodlands; (Feb-) Mar-May (-Jun).

Representative specimens: Texas: *Atascosa Co., N of Pleasanton on Hwy 281, Whitehouse 10346 (SMU); Aransas Co., Goose Island State Park, Johnston 152 (TEX); *Bexar Co., 16 mi S of San Antonio, Schulz

445 (US, cited by Shinnery); *Caldwell Co., 5.0 mi E of McMahan on FM Rd. 713, Nesom 6360 (NLU, RM, RSA, SMU, TEX); Goliad Co. Victoria-Goliad, Tharp 7471 (LL); *Gonzales Co., E of Ottine, 6.6 S of jct in Luling on Hwy 183, Nesom 6232 (ARIZ, ASU, CAS, F, GH, ILL, NLU, NMC, OS, SMU, TEX, UC); *Guadalupe Co., 13 mi S of Seguin on Hwy 123, Nesom 6224 (CAS, ENCB, MO, NCU, NY, SMU, TEX, US); Kenedy Co., Katherine (Armstrong), York s.n. (TEX); Nueces Co., Nueces Bay, Heller 1436 (GH, cited by Shinnery); *Wilson Co., 14 mi NW of Nixon on FM Rd 1681, Nesom 6228 (MICH, NCU, SMU, TEX, UC).

Chaetopappa imberbis was first described by Asa Gray as a variety of Chaetopappa asteroides and later treated by Shinnery at the same rank. Still later, Correll and Johnston (1970) did not recognize it at any rank, sinking it within C. asteroides. Both taxa are slender, taprooted annuals with narrow heads and at least a tendency to produce minute resin droplets on both the vegetative and floral organs.

Although C. imberbis appears to be very closely related to C. asteroides, its 8-nerved achenes with a crown-like pappus of fused scales, lacking bristles, is very different from that of the latter, which has 5 (-6)-nerved achenes with a pappus of 4-6 narrow, separate scales alternating with the same number of thick, awn-like bristles 1.5-3 mm long. The vestiture of loose, slightly crinkly, spreading stem hairs typical of C. imberbis is not known at all in C. asteroides, which has hairs that are shorter, straight, and antorsely appressed, usually tightly, from top to bottom of the stem. Occasional variant individuals in populations of otherwise typical C. imberbis may have stem hairs ascending or loosely appressed on the upper part of the stems, or rarely the hairs may be appressed from top to bottom, similar to that of C. asteroides.

The newly recognized species has a very discrete geographic range in southeastern Texas. At least in most of its range, from Atascosa Co. to Caldwell Co., it appears to be restricted to the deep, loose, light-colored sands of the narrow exposure of the Carrizo Formation (Eocene). Chaetopappa imberbis joins a number of other narrow endemics at least primarily restricted to that outcrop. It is often extremely abundant there but completely absent immediately to either side, where sands are either absent or of a different texture and composition. North of northern Caldwell Co., where the Colorado River floodplain intersects the Carrizo Formation, C. asteroides is generally abundant on the Carrizo sands and C. imberbis appears to be completely absent. Neither taxon was noted in the list of species presented by McBryde (1933). The collections of C. imberbis from Aransas, Goliad, Kenedy, and Nueces Cos. are from sandy habitats in coastal or near-coastal localities separated from the Carrizo Formation.

III. Synopsis of the genus

The following synopsis summarizes what is currently known about the diversity, distribution, and ecology of Chaetopappa and provides

a key to species that emphasizes differences in pappus, which can be observed even on relatively immature fruits. Typification and more detailed synonymy are found in the revision by Shinnars (1946a).

Keck (1958) considered the species of *Pentachaeta* to be congeneric with *Chaetopappa*. Van Horn (1973), however, on the basis of a wide range of evidence rejected this conclusion and maintained the two as separate genera.

CHAETOPAPPA DC.

Annual or perennial herbs 5-30 cm tall. Leaves alternate, simple, entire, linear to oblanceolate-obovate to spatulate. Heads solitary and terminal, not crowded, heterogamous, turbinate-cylindric to hemispheric, 2-10 mm wide; phyllaries elliptic to linear-lanceolate, in 2-6 graduated series, with wide, prominent, whitish-scarious margins. Receptacle scrobiculate, epaleate, flat or slightly convex. Ray flowers uniseriate, pistillate fertile, the ligules usually white, drying white to blue or purple, coiling upon maturity. Disc flowers hermaphroditic, fertile but the central ones sometimes abortive, the corollas yellow, tubular, regular; style appendages shallowly triangular to narrowly triangular. Achenes terete to strongly compressed, 2-5-, 8-, or 10-nerved; carpopodium absent or barely perceptible. Pappus of a hyaline crown, hyaline scales, awn-like bristles, or a combination of alternating scales and bristles, or reduced to a minute crown or ring and appearing essentially absent. Chromosome numbers, $n=8, 9, 16$ pairs.

KEY TO THE SPECIES

1. Pappus absent or essentially so, represented by a minute, thickened ring or corona at the achene summit. (2)
 2. Plants perennial, fibrous-rooted; lower cauline leaves lanceolate-oblong, 6-12 mm wide, subclasping, very abruptly reduced in size in the capitulescence; ray achenes 2-ribbed; pappus a thickened ring or minute, erose crown less than 0.1 mm high *C. effusa*
 2. Plants annual, taprooted; lower cauline leaves obovate-spatulate, 1-3 mm wide, not clasping; ray achenes 10-ribbed; pappus a minute, thickened ring *C. bellidifolia*
1. Pappus of awn-like bristles alone or of scales alone or a combination of alternating bristles and scales. (3)
 3. Pappus of bristles alone, or if scales present, minute and less than 0.1 mm high. (4)
 4. Plants forming low mats less than 20 mm high; pappus of (-4) 5 (-6) bristles 2-4.2 mm long and an outer series of minute scales or squamellae less than 0.1 mm long *C. hersheyi*

4. Plants much taller; pappus usually of 25 bristles, without scales or squamellae. (5)
5. Basal leaves persistent, spatulate; cauline leaves non-overlapping, eglandular, glabrous beneath (abaxially), hairy above; heads 2-3 mm wide; phyllaries glabrous; endemic to northern Coahuila C. plomoensis
5. Basal leaves absent by flowering; cauline leaves densely overlapping, usually glandular, hairy beneath but not above; heads 4-8 mm wide; phyllaries strigose; widepread in Mexico and the western United States C. ericoides
3. Pappus of scales or a crown, with or without accompanying bristles. (6)
6. Pappus of a hyaline crown alone. (7)
7. Plants 4-15 cm tall, annual from a slender taproot C. imberbis
7. Plants usually much taller, perennial from fibrous roots. (8)
8. Lower cauline leaves elliptic-oblongate, mostly 2-5 mm wide, not clasping, gradually reduced into the capitulescence; ray achenes 3-ribbed; pappus a hyaline corona 0.3-0.8 mm high C. parryi
8. Lower cauline leaves lanceolate-oblong, 6-12 mm wide, subclasping, very abruptly reduced in size in the capitulescence; ray achenes 2-ribbed; pappus a thickened ring or minute, erose crown less than 0.1 mm high C. effusa
6. Pappus of scales and bristles. (9)
9. Plants perennial, matted, saxicolous, from branching caudices and fibrous roots; leaves coriaceous. (10)
10. Heads 2.5-3.5 mm wide; longest phyllaries 4-4.5 mm long, glabrous to glabrate; rays 6-10; pappus of (-4) 5 (-6) bristles 2-4.2 mm long and an outer series of minute scales or squamellae less than 0.1 mm long C. hershevi
10. Heads 6-7 mm wide; longest phyllaries 5-6 mm long, prominently hairy; rays 10-24; pappus of 13-19 bristles 3.5-4 mm long and an outer series of scales 0.5-0.8 mm long C. elegans
9. Plants annual, erect, from slender taproots; leaves herbaceous. (11)

11. Heads turbinate-cylindric, 2-3 (-5 in var. grandis) mm wide; achenes 5-nerved C. asteroides
11. Heads hemispheric, 4-10 mm wide; achenes 2-3 nerved. (12)
12. Stems and leaves mostly with appressed-ascending hairs, eglandular C. bellioides
12. Stems and leaves with stiff, spreading hairs, prominently stipitate granular-glandular C. pulchella

CHAETOPAPPA ASTEROIDES (Nutt.) DC., Prodr. 5:301. 1836.

Chaetophora (as Chaetanthera) asteroides Nutt.

Abundant in the eastern half of Texas, to Oklahoma, Kansas, Missouri, Arkansas and Louisiana, northern Tamaulipas, Mexico, and one extremely disjunct locality in northern Hidalgo, Mexico; open sandy or clay soil or rocky soil from limestone or granite, with juniper, oak, or pine or in prairies or savannas; 15-500 m; Mar-Jul (-Nov). Chromosome number, n=8 pairs.

Var. grandis Shinnery, recognized by its wider heads (2.5-5 mm wide vs. 2-3 mm) with more rays (10-18 vs. 5-13) and longer pappus scales (0.5-1.4 mm long vs 0.1-0.8 mm) occurs along the Rio Grande valley in Texas, at the extreme southwestern corner of the range of the species, in Hidalgo, Jim Hogg, Starr, Webb, and Zapata counties. Only the var. asteroides has been collected in Mexico.

CHAETOPAPPA BELLIDIFOLIA (A.Gray & Engelm.) Shinnery, Wrightia 1:71. 1946.

Keerlia bellidifolia A. Gray & Engelm.

Abundant in the Edwards Plateau of south-central Texas; open habitats in sandy, clay, or rocky soil, commonly in calcareous alluvium, limestone hills, usually with juniper and oak; 200-650 m; Mar-Jul.

CHAETOPAPPA BELLIOIDES (A. Gray) Shinnery, Wrightia 1:77. 1946.

Diplostelma bellioides A. Gray

C. bellioides var. hirticaulis Shinnery

Chihuahua, Coahuila, Nuevo Leon, Tamaulipas, San Luis Potosi, Durango, Zacatecas, and Aguascalientes, Mexico, adjacent border counties of south-central and southwest Texas; commonly over limestone, in the area of matorral or chaparral, or juniper, oak, or pine woodlands, rarely in grasslands; (30-) 550-2500 m; Feb-Nov (-Dec). Chromosome numbers, n=8, 9, 16.

Var. hirticaulis was distinguished by Shinnery at the eastern periphery of the species range in the Sierra de San Carlos,

Tamaulipas, by its stem pubescence of spreading or somewhat matted hairs. The typical form, however, occurs with var. hirticaulis in single, intergrading populations in the San Carlos area and does not seem worthy of formal recognition. Further, several collections of otherwise typical C. bellioides with spreading-ascending stem hairs have been made from different localities in Nue. Plants of C. bellioides with atypically large leaves also have been collected from Tamaulipas.

CHAETOPAPPA EFFUSA (A. Gray) Shinners, *Wrightia* 1:68. 1946.
Keerlia effusa A. Gray

Endemic to the central part of the Edwards Plateau in south-central Texas; limestone cliffs or hillsides, sometimes in seepy areas, oak-juniper, oak, or mixed deciduous woods; May-Oct. Chromosome number, n=9 pairs.

CHAETOPAPPA ELEGANS Soreng & Spellenberg, *Syst. Bot.* 9:1. 1984.

Endemic to the White Mountains of south-central New Mexico, crevices in granitic outcrops, area of fir-pine-oak woods; 2500 m; May-Jul. Chromosome number, n=9 pairs.

CHAETOPAPPA ERICOIDES (Torrey) Nesom, see above
Inula? ericoides Torrey
Leucelene ericoides (Torrey) E. Greene
Diplopappus ericoides (Torrey) Torrey & Gray
Leucelene arenosa Heller
Aster arenosus (Heller) Blake

Western United States from Texas and Oklahoma to Nevada, California and Wyoming, northern Mexico from Sonora, Durango, and Zacatecas to Tamaulipas and San Luis Potosi; common in a variety of habitats---grasslands, matorral, Larrea, oak, pine-oak, pine-juniper, mesquite, and thorn-scrub; 1100-2500 m; Mar-Nov. Chromosome numbers, n=8, 16 pairs.

A geographically widespread species highly variable in the type and amount of pubescence as well as other features. Of 34 chromosome counts made from Arizona, New Mexico, Texas, and Chihuahua by Ward and Spellenberg (1986), all except two were tetraploid (n=16 pairs). Shinners (1946) noted that the late season forms are taller with narrower, less pubescent leaves, narrower and fewer-flowered heads, and shorter ligules. Some plants lack the dense vestiture of stipitate glands, but there does not appear to be a clear geographic pattern to the occurrence of these. Shinners also noted that a variant form in northern Mexico with fewer, more widely spaced leaves with long-attenuate petiolar bases might be considered varietyally distinct, but I find intergradation complete between these and more typical plants.

CHAETOPAPPA HERSHEYI S. F. Blake, Proc. Biol. Soc. Washington 59:47. 1946.

Endemic to the Guadalupe Mountains of southern New Mexico and adjacent Texas, rocky (limestone) walls, ledges, and banks in canyons; 1500-2400 m; May-Aug. Chromosome number, n=8 pairs.

CHAETOPAPPUS IMBERBIS (A. Gray) Nesom (see description and discussion above)

CHAETOPAPPA PARRYI A. Gray, Proc. Amer. Acad. Arts 16:82. 1880.
C. keerlioides Shinnery

Coahuila, Nuevo Leon, Tamaulipas, and San Luis Potosi. Mexico, rare in south-central Texas (Brewster Co.); chaparral or areas of oak, oak-juniper, oak-pine-fir, or pine woods, moist stream sides, steep slopes in crevices or talus; 1400-3000 (-3600) m; May-Sep (-Oct).

Chaetopappa keerlioides was described by Shinnery (1946) as differing from C. parryi by larger cauline leaves, but with more collections we find that the range of variation in this character is continuous. According to Shinnery, achenes of C. parryi sometimes bear 1-5 bristles, but this must be very rare because I have never observed bristles at all.

CHAETOPAPPA PLOMOENSIS B. Turner, Sida 7:22. 1977.

A distinctive species known only from the type collection: Coahuila, Mexico, La Cuesta del Plomo on the Musquiz-Boquillas highway, steep limestone slopes and canyon, encinar/izotal; Sep.

CHAETOPAPPA PULCHELLA Shinnery, Wrightia 1:79. 1946.

Chihuahua and Coahuila, Mexico; matorral or chaparral, commonly with Larrea; 950-1750 m; (Mar-) Apr-Oct. Chromosome number, n=8 pairs.

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